

Attachment

6

***Stormwater Flood Management Grant Proposal
City of Palmdale
Monitoring, Assessment, and Performance Measures***

Attachment 6 consists of the following items:

- ✓ **Monitoring, Assessment, and Performance Measures.** The purpose of this attachment is to describe the monitoring, assessment, and performance measures that will be used to evaluate the proposed project. These measures will ensure that this proposal meets its intended goals, achieves measurable outcomes, and provides value to the Region and the State of California.

The purpose of this attachment is to provide a discussion of the monitoring system to be used to verify project performance with respect to the project benefits or objectives identified. This attachment will identify data collection and analysis to be used by the proposed project.

This attachment will also discuss how monitoring data will be used to measure the performance in meeting the overall goals and objectives of the Antelope Valley IRWM Plan. The project applicant has prepared a Project Performance Measures Table (included in this attachment) that includes the following:

- Project goals
- Desired outcomes
- Output indicators – measures to effectively track output
- Outcome indicators – measures to evaluate change that is a direct result of the work
- Measurement tools and methods
- Targets – measureable targets that are feasible to meet during the life of the project

The project performance measures will continue to be refined as the project continues to be developed. A Performance Assessment and Evaluation Plan (PAEP) will be completed for the project prior to receipt of grant funds as shown in Attachments 3 and 5. Project benefits are discussed in more detail in Attachments 7, 8 and 9.

Project:

Upper Amargosa Creek Flood Control, Recharge, and Habitat Restoration Project

The Upper Amargosa Creek Flood Control, Recharge, and Habitat Restoration Project (Amargosa Project) will consist of a suite of activities designed to improve flood control, reduce dependence on imported water by stabilizing current groundwater levels (a source of local supply), and protect the environmental habitat. These activities will be executed in order to meet project goals (listed below). Project goals will each have performance measures that will be used to quantify and verify project performance. The performance measures used to quantify and verify project performance are described in the Project Goals and Performance Measures section below and summarized in Table 6-3.

Project Goals and Performance Measures

Improve Flood Control

The project will reduce the risk of flood damage from stormwater erosion in the vicinity of the project. The project will employ soilcrete embankments to channelize the creek and earthen push-up dams to divert stormwater flows to recharge basins and channel modifications that will help control flood damage in the project area. This performance measure is consistent with the AV IRWM Plan objective of reducing

negative impacts of stormwater, urban runoff, and nuisance water, which would be quantified from the reduction in erosion damage from floods and will be monitored as part of this performance measure.

Protect Environmental Habitat

The project will result in the protection and enhancement/restoration of 25 acres of environmental habitat. All of the 25 acres of habitat enhancement/restoration will be located out of channel. This performance measure is consistent with the AV IRWM Plan objective of preserving open space and natural habitat, which would be quantified from the number of acres of habitat protected and will be monitored as part of this performance measure.

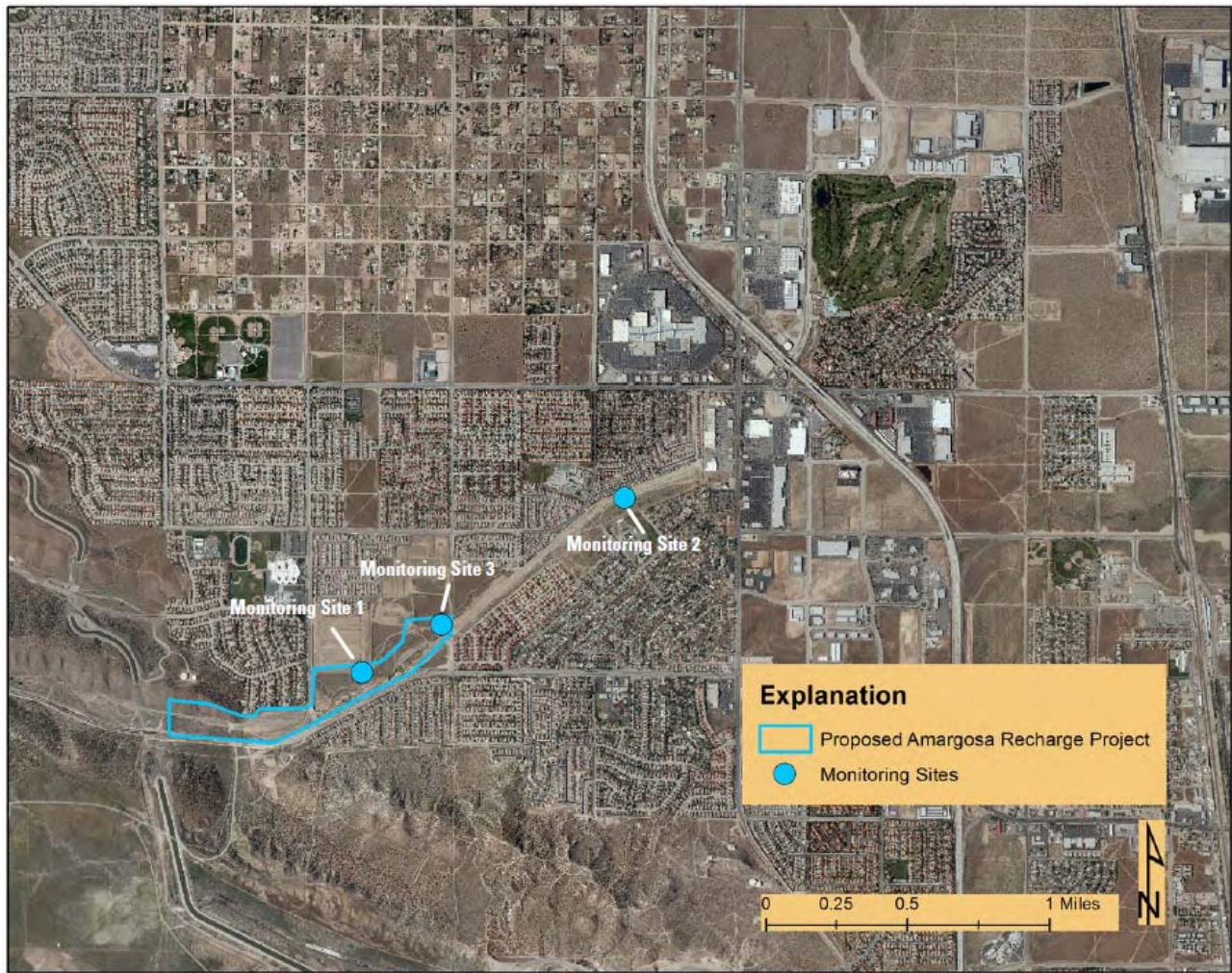
Reduce Dependence on Imported Water

The project will reduce the need for additional imported water entitlement in dry years by increasing recharge in the Region. The project will enable the storage of imported SWP water during the winter and spring when the demand and environmental impacts in the Bay-Delta region are lower. A surplus of water is often available from flood operations in the Bay-Delta region during the winter months. When there is insufficient storage capacity locally for this water, it flows to the ocean or other areas instead of being diverted for beneficial uses. By storing this off-peak water, this project would reduce peak summertime demand on the region's imported water system. The project will help mitigate the effects of dry year shortages in SWP supplies to those purveyors that can pump previously "banked"/recharged water. The reduction in the amount of imported water needed in dry years as a result of the project would be quantified as the amount of recharged water delivered to customers. The reduction in need for additional dry year imported water is assumed to be the delivery of recharged water during dry years. This performance measure is consistent with the AV IRWM Plan objective of reducing mismatch between supply and demand. The reduction in mismatch resulting from this project would be quantified from the recharged water deliveries and will be monitored for this performance measure.

Improve Water Supply Reliability and Stabilize Groundwater Levels at Current Conditions

The project will help replenish valuable groundwater resources in the Amargosa Creek watershed. Recharge of the aquifer will help lower pumping costs, provide more head to existing groundwater wells to increase their yield, help mitigate the risk of subsidence, and prevent upward migration of lower quality groundwater from the deeper aquifer (see below). This performance measure is consistent with the AV IRWM Plan objective of stabilizing groundwater levels to existing conditions. The impact to groundwater levels resulting from this project would be quantified by monitoring groundwater levels at the recharge site as well as total volume recharged and will be monitored as part of this performance measure. Monitoring wells will be used to monitor groundwater levels in the underlying aquifer. Figure 6-1 shows the location of these monitoring wells.

Figure 6-1: Groundwater Monitoring Wells



Improve Water Quality

All water agencies in the area pump water from the upper aquifer; these include the Palmdale Water District, the Los Angeles County Waterworks District No. 40 (LACWWD 40), and over 20 mutual water companies. The lower aquifer contains arsenic, and the arsenic has, so far, mainly been confined to the lower aquifer. However, continued overdraft from the upper aquifer could more readily allow lower aquifer water to migrate into the upper aquifer and result in arsenic in drinking water supplies. Recharging the upper aquifer could help increase pressures thereby reduce the probability that lower aquifer water would migrate upwards. To the extent that pumping can be sustained in the upper aquifer, a decline in drinking water quality due to increased levels of arsenic can be avoided. This performance measure is consistent with the AV IRWMP objective of protecting the aquifer from contamination and will be monitored as part of this performance measure.

Output Indicators

Table 6-1 lists measures to effectively track project output indicators.

Table 6-1: Project Output Indicators

Output Indicators	
Construction of push-up dams to divert flood flows to recharge ponds	This output indicator will be used to track flood control benefit resulting from the project
Construction of soilcrete channel embankments	This output indicator will be used to track flood control benefit resulting from the project
Increase in the number of acres of habitat	This output indicator will be used to track environmental benefit resulting from this project
Reduction in delivery of imported water during dry years	This output indicator will show the impact the project has on the Region's water reliability during dry years.
Deliveries to recharge area	This output indicator will be used to track the actual amount of water recharged as a result of the project
Stable or Rising groundwater levels	This output indicator will be used to verify the project impacts on groundwater levels near the recharge site and the local success of the project

Outcome Indicators

Table 6-2 lists the measures to evaluate change as a direct result of the project work.

Table 6-2: Project Outcome Indicators

Outcome Indicators	
Quantification of number of flood events in the project area	Documenting prior flood events and monitoring the annual amount of erosion damage in the project area will indicate the increase in flood protection resulting from the project
Quantification of habitat protected as a result of the project	This outcome indicator will provide the necessary data needed to determine the environmental benefit resulting from the project by monitoring the area of habitat protected.
Quantification of change in groundwater levels near recharge site	This outcome indicator will provide the data necessary to determine the rise in groundwater levels resulting from the project
Quantification of imported water use avoided as a result of the project in dry years	Monitoring the annual reduction in imported water usage will adequately indicate the amount of local supplies that are being used to offset imported supplies during dry years
Quantification of water recharged as a result of the project	This outcome indicator will provide the actual volume of water recharge in the basin, improving water reliability and local storage.

Table 6-3: Performance Measures Table
Upper Amargosa Creek Flood Control, Recharge, and Habitat Restoration Project

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Improve Flood Control	Increase flood protection	Construction of soilcrete embankments and push-up dams to divert flood flows into recharge ponds	Quantification of the number of historic flood events and flood erosion damage reduced in project area in future	Record of historic and future flood events and damages from erosion	Reduction in amount of flood damage in project area
Protect environmental habitat	Protection and enhancement of environmental habitat	Increase in acres of habitat	Quantification of habitat protected as a result of the project	Record of historic and future flood events	Reduction in number of floods in project area
Reduce dependence on imported water and improve water supply reliability	Increased local storage and recharge in groundwater basin	Stable or rising groundwater levels Deliveries to recharge areas	Quantification of water recharged as a result of the project	Volume of water recharged at site per flow meters; Monitor change in groundwater levels near recharge site	Withdrawal of up to an average of 25,000 AF of water every ten-years or 125,000 AF over the project lifetime
	Reduced need for additional dry year imported water supplies and/or reduced stress on the Bay Delta	Reduction in delivery of imported water during dry years	Quantification of existing imported water use avoided as a result of the project	Volume of recharged water delivered in lieu of imported water	Reduction in imported water dependence by up to 25,000 AFY in dry years or 125,000 AF over the project lifetime
Stabilize groundwater levels at current conditions	Stable or increased groundwater levels in Basin	Stable or rising groundwater levels	Quantification of water recharged as a result of the project	Volume stormwater collected at recharge area per flow meters; Volume SWP water delivered to recharge area per flow meters	Increased groundwater storage/recharge by 25,000 AF of water every year
			Quantification of change in groundwater levels in Region	Monitor groundwater levels in Basin	Change in groundwater level greater than or equal to 0 using a 10-year moving average
Improve water quality	Protect aquifer from contamination	Stable or rising groundwater levels in upper aquifer; Deliveries to recharge basin	Quantification of water recharged at the site	Volume recharged per site per flow meter; Monitor change in groundwater levels near recharge site	Compliance with arsenic regulations 100% of the time.